REMARKS / ARGUMENTS

In response to the Final Office Action of October 12, 2005, Applicants have amended the application to resolve concerns raised by the Examiner. Entry of this Amendment and reconsideration and allowance of the pending, amended claims are respectfully requested.

I. Invention Overview

The invention is a performance enhancing break-in method for a proton exchange membrane ("PEM") fuel cell that includes cycling potentials of an anode electrode and/or a cathode electrode from a first potential to a second potential and back to the first potential, and repeating the cycling for one or both electrodes for at least two electrode cycles. The potential cycling may be achieved by applying a direct current from a programmable direct current power source to the electrodes. Alternatively the potential cycling may be achieved by varying reactants to which the anode and cathode electrodes are exposed. The break-in method significantly shortens an amount of time necessary to bring the fuel cell up to maximum operational capacity.

II. Response to Office Action

In the October 28, 2005 Final Office Action, the Examiner

rejected claims 1-3, 5-7 and 9 as being anticipated under 35 U.S.C. Sec. 102(e) by U.S. Pre-Grant Publication No. 2003/0224227 to Voss. The Examiner also indicated that claims 4 and 8 would be allowable in light of Voss if they were amended to include all of the elements of their base claims and any intervening claims. In response Applicants have amended the elements of dependent claim 4 into independent claim 1, and have cancelled claims 2, 3 and 4.

However, after careful review of Voss, Applicants concluded that independent claim 5 and its dependent, non-objected to claims 6, 7, and 9 were substantially distinct from the disclosure of Voss. Consequently, the undersigned conducted an interview with the Examiner to review the distinctions between rejected claims 5-7 and 9. In essence, the Applicants stressed that independent claim 5 requires cycling of the potential of both the cathode and anode electrodes. In cycling the potential of the anode electrode, claim 5 requires "exposing the cathode electrode (16) to a gas selected from the group consisting of a hydrogen containing gas, a reducing fluid reactant, and a mixture of a reducing fluid and an inert gas". (Claim 5(c).) Applicants urged that nothing in Voss shows or suggests exposing the cathode electrode to any of the three constituents of the "Markush" group.

The Examiner responded, however, that it may be possible for one to read the listing of the constituents of the Markush group of compounds to which the cathode electrode is exposed as

including four constituents, wherein one of the constituents is "an inert gas", rather than "a mixture of a reducing fluid and an inert gas". In other words, the Examiner urged that a possible reading of claim 5(c) is that during cycling of the anode electrode, the cathode electrode may be exposed to only an inert gas. The undersigned responded that such a reading would be inconsistent with the specification, and that instead the proper reading consistent with the specification is that the cathode electrode would be exposed to either "a hydrogen containing gas", "a reducing fluid reactant" or "a mixture of a reducing fluid and an inert gas", and not to "an inert gas" alone.

After careful consideration, the Examiner agreed that the Applicants' interpretation would most likely be the proper interpretation of the Markush group of claim 5(c). But to remove any possible doubt, the Examiner asked the undersigned to submit this explanation of the proper interpretation of the Markush group to thereby make that interpretation available as part of the Official File of this application, and to also point out within this explanation where the specification supports that the Markush group cannot be read to include "an inert gas" as one of the constituents of the group. The undersigned and the Applicants thank the Examiner for his cooperative approach to this matter.

The specification supports the interpretation of the claim 5(c) Markush group as including only three constituents in

particular at page 10, line 26 to page 11, line 12, which recites (emphasis added):

> During the anode cycles the cathode electrode 16 is exposed to a pure reducing fluid reactant, such as hydrogen gas directed from the anode reducing fluid source 52, or a mixture of a reducing fluid and an inert gas from the cathode inert gas source 58, and the anode electrode 14 is exposed to the inert gas from the anode inert gas source 40. The electrode exposed to the hydrogen containing reducing fuel serves as a reference electrode in the fuel cell 12. <u>The potential of the electrode is approximately 0.00 volts versus the "SHE" if the fuel is 100% hydrogen, and approximately 0.04 volts if the fuel stream is about a 4% hydrogen-inert gas mixture, such as 4% hydrogen and 96% N_2.</u> The potential of the electrode is approximately 0.95 volts if the oxidant reactant is air containing 21% oxygen and is approximately 1.00 volts if the oxidant reactant is 100% oxygen. An inert gas, such as nitrogen, is placed on the cathode during the cathode cycle or cathode fill cycle and on the anode during the anode cycle or anode fill cycle because this minimizes the current that must flow through the fuel cell 12 to effect the desired changes in electrode potential.

This shows that a range of hydrogen associated with the three described reducing fluids as between 100% and "4% hydrogen

and 96% N_2". It also shows that "anode cycle" is also referred to as the "anode fill cycle". In Table 1 on page 8, the "Gas on the Cathode" during the "Anode Filling Cycle" is "4%H_2-N_2". In Table 2 on page 9, the "Gas on the Cathode" during the "Anode Filling Cycle" is "100% H_2". Again, this shows for the examples in Tables 1 and 2 no use of only "an inert gas" on the cathode during the anode potential cycling.

Moreover, at page 14, lines 1 - 7, the specification discloses (emphasis added):

> Additionally, in application of the first and second embodiments described in TABLES 1 and 2, the oxidant may be air, or in contrast, the oxidant may be pure oxygen, which enhances the break-in method. <u>The reducing fluid utilized may also be either as low as about 4 percent ("%") hydrogen, or as high as pure hydrogen.</u> Pure hydrogen will also enhance the break-in method.

This clearly establishes that the "reducing fluid" used may vary in concentration from 100% pure hydrogen to 4% hydrogen, therefore clarifying that the phrase "a mixture of a reducing fluid and an inert gas" is to include such a range of less than 100% pure hydrogen to as low as 4% hydrogen. Accordingly, the specification supports the conclusion that the Markush group of claim 5(c) includes only three constituents, namely - "a hydrogen containing gas", "a reducing fluid reactant" and "a mixture of a reducing fluid and an inert gas". The Markush

group therefore does not include "an inert gas" alone.

III. Conclusion

By the present amendment to effectively cancel claims 1, 2 and 3 by bringing the elements of canceled claim 4 into independent claim 1, and by clarifying the correct interpretation of the language of independent claim 5, it is urged that the pending claims are now in condition for allowance. The Applicants again thank the Examiner for his cooperative approach to putting this application in condition for allowance; for his offering to provide in his next mailing an "Interview Summary" for the Dec. 28 and 29 telephone interviews with the undersigned; and, for his agreeing to enter the present Amendment. Accordingly, it is respectfully requested that the Examiner enter this Amendment, remove the rejections of the pending claims, and issue a Notice of Allowance.

Respectfully submitted,
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